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# Synthesis, Characterization of Shiff Base Cu Salpn Complexes and Biological Pontential Study

**A. Akila[1], J. Shakina[2]***

[1,*2]*Department of Chemistry, Sarah Tucker College(Autonomous), Tirunelveli, TN, India.*

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## *Abstract*

*Shiff bases are versatile ligands synthesized from the condensation of an amino compound with carbonyl compounds(1). The biological activity of the transition metal complexes derived from the Schiff base ligands has been widely studied. Salpn is the common name for a chelating ligand, properly called N,N'-bis(salicylaldehyde)-1,2-propanediamine. The complexes of copper with Schiff bases have wide applications in food industry, dye industry, analytical chemistry, catalysis, fungicidal, agrochemical, anti-inflammable activity, antiradical activities and biological activities.A new Cu salpncomplex has been synthesized from the rection of Salpn(N,N'-bis(Salicylaldehyde)1,3-propanediamine) with Copper Sulphate pentahydrate($Cuso_4 5H_2O$).The synthesized complex was characterized by IR and UV spectral techniques. Antimicrobial activity of this complex have been tested against to the Antinomycesisraelii bacteria,Coreynebacterium diphtheria bacteria and Staphylococcus aureus bacteria by using Agar well diffusion method(2).*

***Keywords:*** *Antibacterial Activit; Agar Well Diffusion Method; Salpn.*

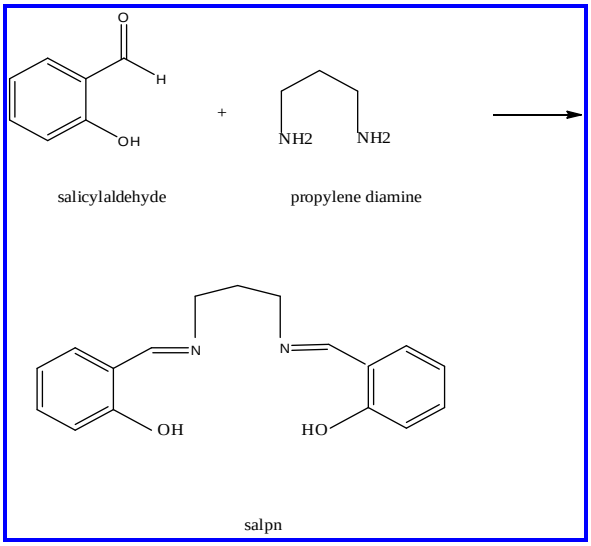
## 1. INTRODUCTION

Shiff bases are widely used as analytical reagents since they allow simple and inexpensive preparation of a number of organic and inorganic compounds. Shiff base compounds are very important in medicinal and pharmaceutical fields because of their wide spectrum of biological activities. Most of them show biological activities such as antibacterial, antifungal as well as antitumour activity. Antibiotics are one of our most important weapon in fighting bacterial infections and have greatly benefited the health-related quality of human life sciencetheir introduction. However, over the past few decades, these health benefits are under threat as many commonly used antibiotics have become less and less effective against certain illness not only because many of them produce toxic reactions but also due to emergence of drug-resistant bacteria. It is essential to investigate newer drugs with lesser resistance. Salpn form stable chelate complexes with many metals including copper, iron and nickel. It is coordination with copper that makes it a popular choice as a fuel additive. Copper has the highest catalytic activity in fuel, and Salpn forms a highly stable Squar Planar complex with metal.

## 2. MATERIALS & METHOD

### 2.1. Synthesis of Salpn-N,N'-bis(salicylaldehyde)1,3-propane diamine

1,3-Propane diamine(2.083g) was dissolved in 30 ml of methanol and was added dropwise to a stirred solution of Salicylaldehyde(6.1g, 0.05mol) in Methanol (30ml) at room temperature. The reaction flask was equipped with Calcium Chloride guard tube to prevent ingress of moisture. After this was stirred 30 minutes the reaction mixture was filtered, the filtrate collected and solvent removed, the filtrate collected and solvent removed, the crude product was washed with water(60ml) and dried under vaccum. Recrystallisation from petroleum ether afforded Salpn as a yellow solid.

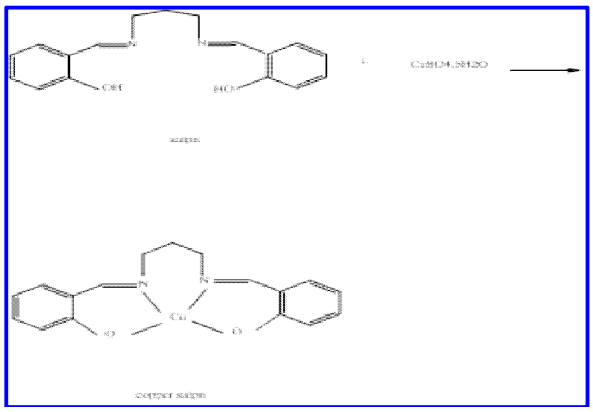



**Scheme 1 (**Yield : 3gm Melting point :98-99$^0$c)

*** J. Shakina***
***email: shakinajudson@gmail.com***

### 2.2. Synthesis of Cu Salpn

3ml of this $H_2$Salpn in 10ml of Methanol was added to a solution of 2.528g of Copper Sulphate Pentahydrate in 10ml of Methanol with constant stirring. The mixture was refluxed for 1 hour at room temperature. The precipitate was filtered, washed with Methanol and dried in air.



**Scheme 2 (**Yield :75% Colour : Dark green colour)

## 3. RESULT & DISCUSSION METHOD

### 3.1 FT-IR Analysis

The CuSalpn is Characterised by FT-IR to find the functional groups. Fig.1. Shows the broad band 3424.8cm$^{-1}$ which indicates the amine for bending stretching. C-N Stretching band,Cu-N bending band, weak C-H band, C=C stretching band at 1143.47cm$^{-1}$, 455.20 cm$^{-1}$, 3064.5cm$^{-1}$ and 1535.34 cm$^{-1}$ are present in the Cu Salpn complex. The corresponds C=N stretching band is observed at 1627.92 cm$^{-1}$.The peak at 756.10 cm$^{-1}$, it is due to the aromatic ring substitution band(bending mode).

### 3.2 UV Analysis

UV is an analytical technique commonly used to find the quantity or concentration of the sample using the calibration curve. It mainly works on conjucated systems (double bond and stuff…). UV/VIS have high radiation energy with wavelength ranging from 10 to 800 nm. When UV is beamed at structures electrons in σ and π bonds transmitted from stable to unstable electronic excited state. If the bond breaks, the whole molecule will collapse as these are the bonds that hold the molecules together. These bonds are also strong and require a UV radiation of <150nm. As a result the radiations less than 150nm is useless for us. However if we excite the weak bond to [$\pi*$] in unsaturated systems, there would be no harm and we can get a reading without damaging our molecule. Fig. 2 shows that the Cu Salpn has a maximum absorbance of 250.1nm.

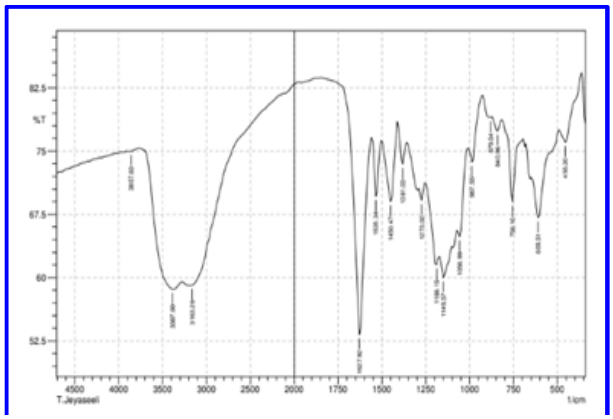


**Fig. 1: FT-IR Analysis of Cu Salpn Complex**

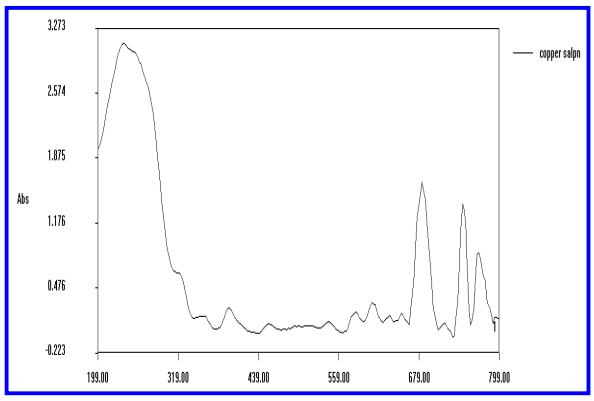



**Fig. 2: UV Analysis of Cu Salpn Complex**

### 3.3 Antimicrobial activity

Cu salpn is well known as one of the most antimicrobial substance. The antimicrobial activity of the synthesized cu salpn complex against bacteria suchas Antinomyces Israeli, Corynebacterium diphtheria, Staphylococuss aureus by using Agar well diffusion method. Petri plates containing 20ml nutrient agar medium were seeded with 24hrs culture of bacterial strains (Antinomyces Israeli, Corynebacterium diphtheria, Staphylococuss aureus) were cut and different concentration of sample(Cu Salpn-50µg/ml, 100µg/ml, 250µg/ml, 500µg/ml) was added. The plate is incubated at 37C for 24 hours. The antibacterial activity was assayed by measuring the diameter of the inhibition zone formed around the wells. Gentamicin antibiotic was used aspositive control. The values were calculated using GraphPad Prism 6.0 software (USA).

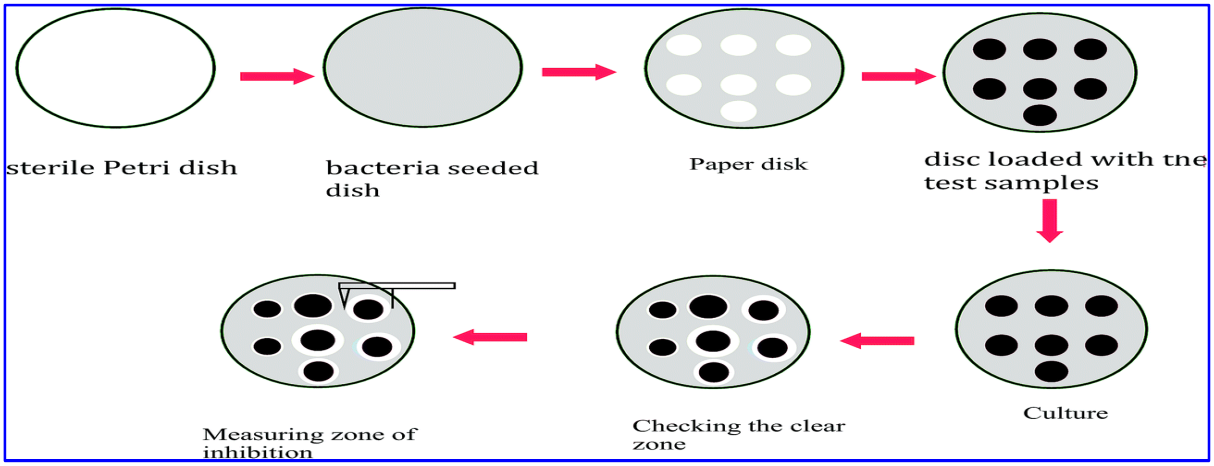



**Fig. 3: Agar Well Diffusion Method**

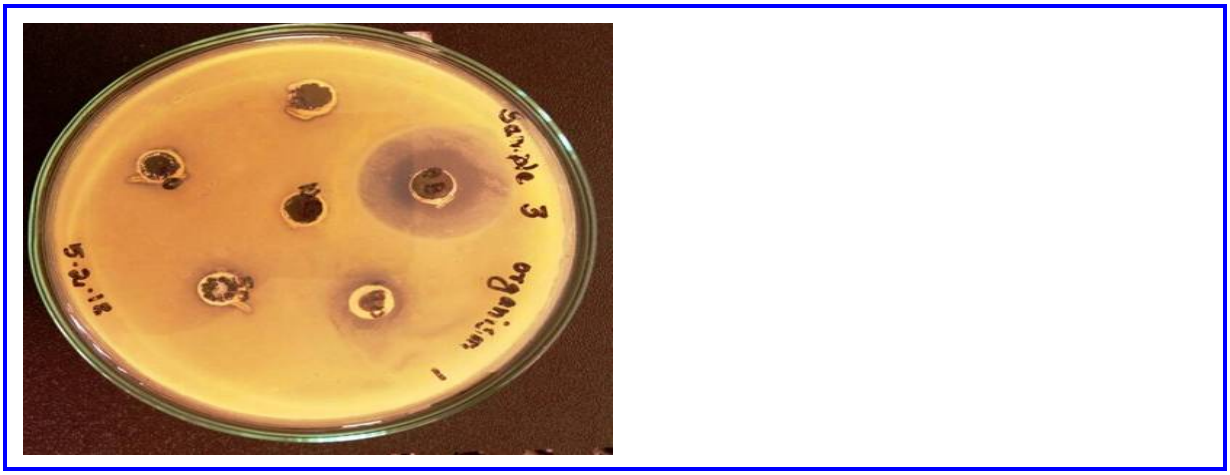


**Fig. 4: Zone of inhibition obtained by Cu Salpn against *Actinomyces israelii***

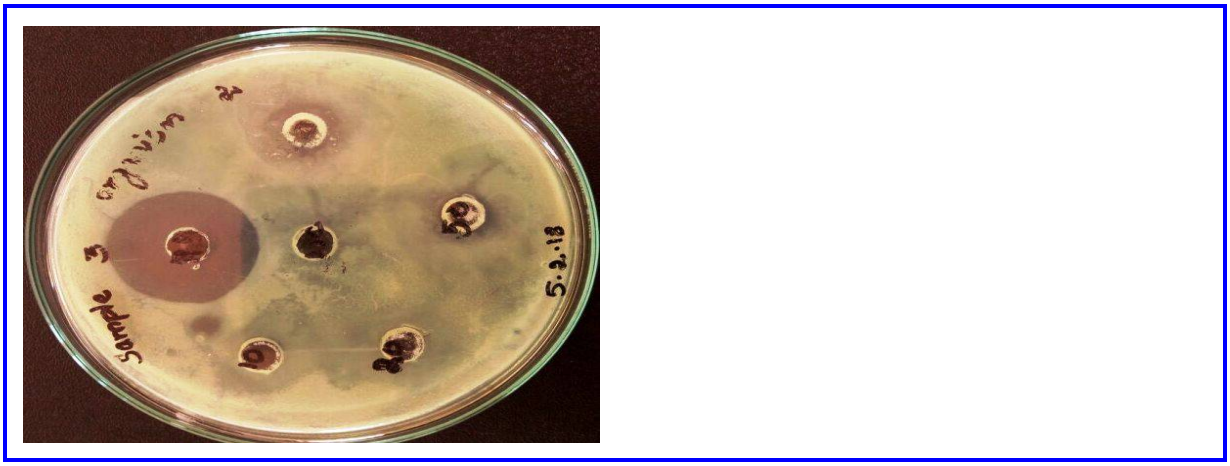


**Fig. 5: Zone of inhibition obtained by Cu Salpn against Corynebacterium diphtheria**

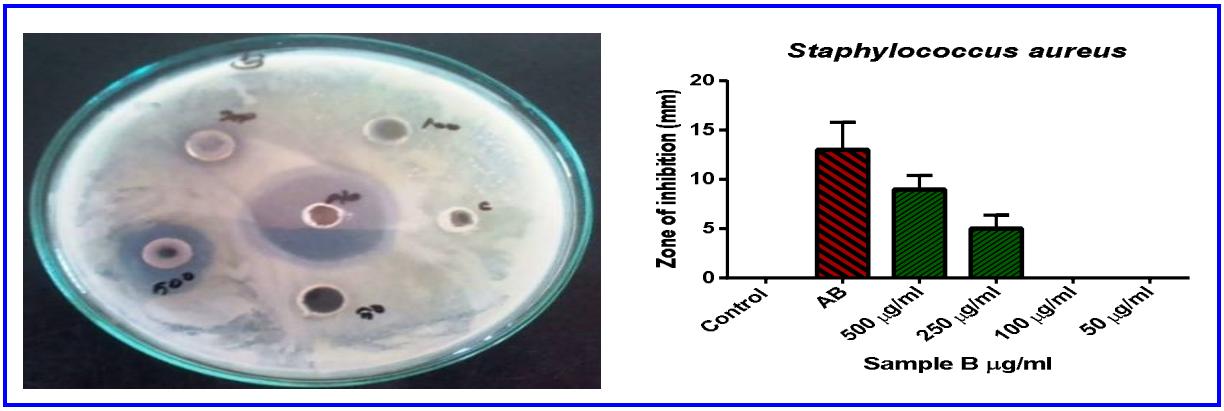



**Fig.6. Zone of inhibition obtained by Cu Salpn against Staphylococcus aureus.**

Zone of inhibition obtained by Cu Salpn against Actinomyces Israelii, Corynebacteriam diphtheria and Staphylococcus aureus:

**Table 1. Cu Salpn-Zone of inhibition (mm)**

| S. No | Name of the organism | Control | Antibiotic | 50 µg/ml | 100 µg/ml | 250 µg/ml | 500 µg/ml |
|---|---|---|---|---|---|---|---|
| 1 | Antinomyces isreaelii | 0 | 11 | 0 | 1 | 2.6 | 8 |
| 2 | Corynebacterim diphtheria | 0 | 13.9 | 0.5 | 2.5 | 5.5 | 7.5 |
| 3 | Staphylococuss aureus | 0 | 13 | 0 | 0 | 5 | 9 |

## 4. CONCLUSION

Shiff base ligands are considered privileged ligands because they are easily prepared by a simple one pot condensation of an aldehyde and primary amines. The data showed that transition metal complexes have significant improved antibacterial activity than parent compound. The best antibiotic is *Corynebacterium diphtheria* than *Antinomycesisraelii* and *Staphylococcus aureus.*

## REFERENCES

Arulmurugan, S., Helen P. Kavitha and Venkatraman, B. R., Biological activities schiff base and its complexes: A review, *Rasayan J. Chem*., 3(3), 385-410(2010).

Nair, R., Shah, A., Baluja, S. and Chanda, S., Synthesis and antibacterial activity of some schiff base complexes, *J. Serb. Chem. Soc*., 71(7), 733–744(2006). doi: 10.2298/JSC0607733N

Navan R.Bhalodia and Shukla, V. J., Antibacterial and antifungal activities from leaf extracts of *Cassia fistula* : An ethnomedicinal plant, *J. Adv. Pharm. Technol. Res*., 2(2), 104-109(2011). doi: 10.4103/2231-4040.82956

Parastoo Karimi Alavijeh, Parisa Karimi Alavijeh and Devindra Sharma, A study of antimicrobial activity of few medicinal herbs, *Asian J. Plant and Research*, 2(4), 496-502(2002).

Reddy, P. S., Jamil, K., Madhusudhan, P., Anjani, G. and Das, B., Antibacterial activity of isolates from *Piper longum* and *Taxus baccata*, *Pharmaceutical Biol*., 39(3), 236–238(2001). doi:10.1076/phbi.39.3.236.5926

Rishu Katwal, Harpreet Kaura and Brig Kishore Kapur, Application of Copper- Shiff's Base Complexes : A Review, *Sci. Revs. Chem. Commun*., 3(1), 01-15(2013).

Salehia, M., Kubickib, M., Dutkiewiczb, G., Rezaeic, A., Behzada, M. and Etminania, S., Synthesis, Characterization, Electrochemical Studies and Antibacterial Activities of Cobalt (III) complexes with SalpnTipe schiff base ligands. Crystal Structure of trans $[Co^{III}(L^{1})(Py)_2]ClO_4$, *Russian Journal of Coordination Chemistry*, 39(10), 716–722(2013). doi:10.1134/S1070328413100084

Shahidi, B. H., Evaluation of antimicrobial properties of Iranian medicinal plants against Micrococcus luteus, Serratia marcescens, Klebsiella pneumonia and Bordetella bronchoseptica, *Asian J. Plant Sci*., 3, 82–86(2004). doi: 10.3923/ajps.2004.82.86